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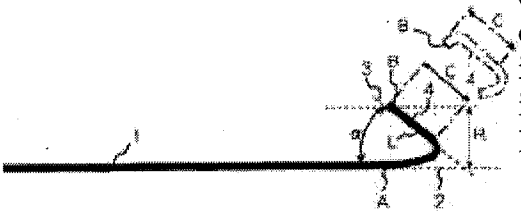
(54) MEDICAL GUIDE WIRE SUPERIOR IN OPERABILITY



(57)Abstract:
PROBLEM TO BE SOLVED: To improve operability and safety, by controlling a tip shape (an angle, a width, the tip straight line part length and the tip curve part length) of a medical guide wire.
SOLUTION: A tip angle of the medical guide wire defined in this invention is controlled in 10 to 120 degrees. A width dimension of a curve part at the tip part is set to 3 mm to 10 mm. The length of the tip curve part is set to 5 mm to 10 mm. The length of the tip straight line part is set to less than 10 mm.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
This invention relates to the medical-application guide wire used in order to introduce into the target part of a blood vessel the catheter or introducer kit used as a therapy or checking.
[Background of the Invention]
[0002]
When performing diagnosis, a therapy, etc., a medical-application guide wire is used in order to introduce a catheter or an introducer kit in a blood vessel and to detain in the affected part. Therefore, tip shape attachment with possible a medical-application guide wire following in footsteps and stuffing into blood vessel shape the inside of the blood vessel which branches and moves in a zigzag direction, without doing damage to a blood vessel is needed. In recent years, from the feed port to the blood vessel of a catheter being femoral (femoral region) (upper arm), or it is shifting to radial (wrist) one and this request is becoming increasingly strong.
[0003]
In order to make it possible to advance a guide wire to the position of a request of the heart, shape attachment of a commercial guide wire tip part (shaping) is made. Tip shape serves as an important element on the function, so that shape attachment (RISHIEPU) is given by the medical practitioner with fingers according to the shape of a tee at the clinical spot.
[0004]
The tip of the wire used when pushing in toward the heart from brachial one or radial one is in the tendency for the thing of the standard by which shape attachment was carried out to be used for J type in recent years, in order to prevent the penetration (meandering) to a branching blood vessel in the middle of insertion.
[0005]
When inserting in an introduction needle, a catheter, or a sheath the medical-application guide wire which carried out shape attachment of the tip at the curved form, the inserter is used as an insertion technical aid. In order to insert J type wire in an introduction needle, a catheter, or a sheath especially, insertion is very difficult without an inserter.
When inserting J type wire in an introduction needle, a catheter, or a sheath, there is a thing indicated by the patent documents 1 to have improved the insertion nature into an inserter improving the structure and correcting [an inserter is required as above-mentioned, and] the bend of a wire.
[0006]
Conventionally, the guide wire in which the angle at a tip has the curved tip part which has an angle defined by this invention by a guide wire about 0.4 mm in diameter as a guide wire for a therapy is also known. Since this guide wire has the thin path, X ray visibility is low, requires an improvement of visibility, such as attaching a golden coil wire at a tip, and completely differs from the guide wire of a structure Uemoto invention. Since it is easy to bend thinly, there is also a problem which goes into blood vessels other than the purpose easily. Although practical use is mainly presented with stainless steel or a nickel titanium system alloy as a core wire of a medical-application guide wire, the superelastic nickel titanium system alloy is in use especially in recent years. (The patent documents 2, the patent documents 3, patent documents 4).
[Patent documents 1] JP,H7-155382,A

[Patent documents 2] JP,H2-24550,B
[Patent documents 3] JP,H2-24548,B
[Patent documents 4] JP,H2-24549,B
[Description of the Invention]
[Problem(s) to be Solved by the Invention]
[0007]
In the medical-application guide wire tip, shape attachment is made by J type, the double angle type, or the angle type. in this, when introducing a guide wire from brachial one or radial one, the case where the medical-application guide wire by which shape attachment of the tip was carried out at J type cannot be smoothly pushed in in a blood vessel is alike occasionally, and has been carried out.
[0008]
Operation which draws out a guide wire from a sheath during an operation may be performed frequently, in the case of J type wire, whenever it inserts a wire in a sheath again, a technical aid like an inserter must be used every, and there is a problem which forces a medical practitioner etc. unnecessary work and time.
[0009]
When the superelastic nickel titanium system alloy of the patent documents 2-4 is used for core wire metal, tip shape attachment by J type or this invention has a very difficult fault. The fault which cannot perform tip shape attachment by the clinical spot by a medical practitioner is also pointed out. The guide wire (JP,H10-146390,A) which stuck the metal coil to the tip part in order to improve this fault, and has improved tip shape attachment is proposed.
[0010]
Based on the above various knowledge, the place which this invention persons make complete this invention for examination in piles wholeheartedly, and is made into the purpose Brachial, Or it compares with J type wire used when introducing a guide wire toward the heart from radial one, It is a guide wire which has the tip shape which enables guide wire introduction smoothly, And it is in providing the medical-application guide wire which does not need an excessive technical aid like the inserter which is needed when inserting a wire in an introduction needle, a catheter, or a sheath and which is used for angiography or an introducer excellent in operativity.
[0011]
The introducer detention needle at the time of inserting a guide wire in a blood vessel, if this is explained in more detail, or the insertion ease to the connector section of a catheter, The size of the pushing resistance over the blood vessel in the moving process to a treated area and the incorrect penetration nature to a branching blood vessel until it reaches a treated area is important as performance of a guide wire, and is providing the guide wire excellent in the balance of such performances.
[Means for Solving the Problem]
[0012]
Namely, it is a medical-application guide wire which has the tip part which this invention consisted of a metal core wire by which surface coating was carried out by resin, and was bent in the shape of a smooth curve, An angle which direction extension wire of this tip part and a wire ground line make 10 to 120 degrees, Most preferably 30 to 80 degrees still more preferably 20 to 90 degrees 40 to 70 degrees, The length of a curved section is a medical-application guide wire by which the length of not less than 5-mm less than 10 mm and a tip straight part is used for beak type angiography or an introducer which comes out and is characterized by a certain thing for a

width dimension of not less than 5-mm less than 10 mm and a curved section less than 10 mm.
[0013]
It is a medical-application guide wire which has the tip part which this invention consisted of a metal core wire by which surface coating was carried out by resin, and was bent in the shape of a smooth curve, It is a medical-application guide wire used for beak type angiography or an introducer, wherein a diameter of a guide wire containing a resin layer is 0.46-1.02 mm and an angle which direction extension wire of this tip part and a wire ground line make is 10 to 120 degrees.
[Effect of the Invention]
[0014]
The guide wire which has the tip by which shape attachment was carried out at the diameter and angle which are specified by this invention, As compared with the conventional thing by which shape attachment was carried out, the effect which controls meandering to the tee of a blood vessel pushed in highly (being in a tendency) as compared with J type wire, and it drew out with the load at the time, and the resistance at the time was small, and could not damage the blood vessel surface easily, and it was shown that operativity is good. Although the conventional J type wire needed the inserter at the time of the introduction to an introduction needle, a sheath, or a catheter, the guide wire by this invention was unnecessary, and has improved operativity.
[The best gestalt for an invention to carry out]
[0015]
This invention guide wire tip shape, without moving in a zigzag direction into the heart at a branching blood vessel in the middle of introductory, And in order to enable the resistance at the time to draw out with the time of pushing and to be able to operate it smoothly small, The angle which has the tip which the core wire bent in the shape of [which covered the surface with metal by resin] a smooth curve, and the direction extension wire at this tip and a wire ground line make is the highly efficient medical-application guide wire which was excellent in the range of 10 to 120 degrees at the operativity which carried out shape attachment.
[0016]
The above-mentioned angle is the angle alpha defined by drawing 1, and alpha is 40 to 70 degrees most preferably 30 to 80 degrees still more preferably 20 to 90 degrees 10 to 120 degrees. In this invention, the wire which has the tip part at which it turned at the above-mentioned angle is called a beak (beak) type. In drawing 1, the horizon in the state where it placed horizontally without applying power to the wire 1 is the wire ground line 2, and the angle which an intersection with the direction extension wire 3 at the tip in the state where the tip part 4 was stood vertically makes is set to alpha. Still more preferably in [alpha is preferred 10 to 120 degrees, and / 30 to 80 degrees / most preferably] 40 to 70 degrees 20 to 90 degrees, It is in the tendency for insertion to be easily improved with sufficient balance of the incorrect penetration nature to a branching blood vessel by an introducer detention needle or the catheter connector part not using an inserter. Relatively, in a small angle, although it can insert in an introducer detention needle or a catheter connector part not using an inserter, as for insertion nature, alpha tends [for alpha to be 10 to 30 degrees] to fall as compared with a large thing (alpha is 40 to 120 degrees). On the other hand, 70 to 120 functions to prevent incorrect penetration at a large angle relatively although insertion nature is good tend to fall. Therefore, what is necessary is just to set alpha as 10 to 120 degrees for the degree of point angle according to a military requirement.
[0017]

When the definition of the direction extension wire of a tip is explained still in detail, the direction extension wire of the portion which exists in the direction of a ground line from the tip of a curved section in the smoothly bent tip part is said, and that whose uppermost tip part is a straight line is the direction extension wire of this straight line. That whose uppermost tip part is not a straight line makes the line which connects the line central point in a 3-mm point to a tip toward a curved section a tip directional traverse, and makes the extension wire the direction extension wire of a tip. That is, by this invention, since a tip straight part is included, the direction extension wire in the definition concerned means the direction extension wire of this tip straight part.

[0018]

The total length of the tip curved section of the guide wire of this invention is length [from the point A of the bend tangent of a ground line to the uppermost tip part B] L, the width of a curved section is shown in [R] a figure, and it is **.

**. L is not less than 5 mm less than 10 mm, and R is [the length of 5-10 mm and a tip straight part of the guide wire of this invention] less than 10 mm. In detail, when alpha is [R] 4-8 mm in the length of a tip straight part at 10 to 120 degrees and it is 5-7 mm in the length of a tip straight part still more preferably 5-9 mm, R is 6-9 mm. On the other hand, in R, alpha is 2-9 mm, when the length of a tip straight part is 2-5 mm at 40 degrees - 70 degrees.

Tip shape is described below in detail. The tip shape said by this invention is determined by length [of the degree alpha of point angle, and a tip straight part] C, and length L of a tip curved section. Drawing 1 is a ground line by the side of the root of the guide wire 1, and 4 is a straight part of a wire top end, and sets the length of this portion to length C of a tip straight part. Like the broken chain line at the upper right of drawing 1, when the uppermost tip part B of the wire has bent from the ground line 3 to the inside or the outside of the curve, the length of a direction parallel to the ground line 3 until a wire begins to bend from the tip B to the ground line 3 is set to length C of a tip straight part. In this invention, the most important thing in these elements is the degree alpha of point angle.

[0019]

The metal used for the guide wire core wire of this invention is metal usually used for this use, and is a nickel titanium system alloy, a copper system alloy, an aluminum system alloy, or stainless steel. The diameter of the guide wire used for this invention 0.46-1.02 mm (0.018-0.040 inch), They are 0.89 mm - 1.02 mm (0.035-0.040 inch) most preferably 0.64 mm - 1.02 mm (0.025-0.040 inch) still more preferably 0.56 mm - 1.02 mm (0.022-0.040 inch). If it becomes a diameter of 0.46 mm or less, also in the tip shape which this invention defines, the probability of the incorrect penetration to a branching blood vessel will become high according to excessive tip pliability.

[0020]

The bending load (bending load when the middle point with a length between fulcrums of 14 mm is pushed in 0.8 mm) which shows the pliability of the guide wire in a guide wire tip curved section, 0.5N-0.01N -- desirable -- 0.4N-0.03N -- further -- desirable -- 0.03N-0.05N -- it is 0.2N-0.07N most preferably.

[0021]

Although it cannot be overemphasized that the pliability of a guide wire is greatly influenced like **** with the diameter containing a resin layer, It can control by factors, such as a diameter of the metal used for the core wire, and tip shape processings (temperature control in the taper shape and thermoforming which turn the diameter of a metal core wire at a tip, and are gradually

made small, etc.), still more correctly. When it explains in detail, as a required physical characteristic at the tip of a guide wire, A tip part is wanted to optimize the spring stiffness of a tip curved section in respect of the quick shape change (return speed from the extended state to beak type tip shape) within a blood vessel, processability (it is easy to carry out shape attachment as target shape), pushing nature, etc., and to have the pliability of a grade in which a blood vessel wall is not damaged. Therefore, setting out of the taper processing method at the tip of a metal core wire and the heat treatment condition of tip shape attachment becomes important about the tip shape of a guide wire with the guide wire shape containing a resin layer.

[0022]

Below, it is explained as the shape of nickel titanium system beak type guide wire core wire metal per tip shape processing method at details. The diameter of the core wire of a curved section used in this invention is 0.08-0.15 mm most preferably 0.05-0.2 mm still more preferably 0.03-0.3 mm 0.01-0.4 mm. The whole length of the guide wire of this invention is about 1500-2300 mm, and the diameter of the core wire of a ground line portion is 0.3-0.9 mm. If a 100-200-mm point is made into the halfway point towards Motobe from the tip of a curved section and the diameter of a core wire is made thin towards a tip from the halfway point, the operativity of a wire will be improved further.

[0023]

The guide wire generally used conventionally has the starting point of a curved section at about 30 mm of tips, taper processing of the diameter by the side of a core wire base is carried out toward the tip from about 0.2 mm, and a tip has a diameter of about 0.1 mm. The thing of the constant diameter whose diameter from 30 mm of tips is about 0.1 mm can also be used. Continuous or gradual tapered structures, such as one step, two steps, or three etc. steps, may be sufficient as the taper processing of a curved section. It is determined by experiment in which position of a curved section the stage of a taper is established. The diameter of the metal core wire of an uppermost tip part is 0.05-0.10 mm most preferably 0.04-0.12 mm still more preferably 0.03-0.15 mm 0.01-0.20 mm. In order to reduce the damage to a blood vessel wall, it is desirable by making thin the diameter of the metal core wire of an uppermost tip part to make rigidity small.

[0024]

In order to give pliability to an uppermost tip part, it is possible by making thin the diameter of the metal core wire of an uppermost tip part, but the fault to which the processability to a final product becomes difficult in this case is pointed out. The structure which changed the latest straight-line portion into flat shape (a sectional rectangle or an ellipse) is preferred so that the stress of a guide wire may become small as this solution. When 6 mm of uppermost tip parts processed into section flat shape the perfect circle guide wire of the diameter which is 0.1 mm, it was possible to have controlled an elastic modulus freely (10 to 90% of perfect circle wires).

[0025]

Drawing 2 thru/or drawing 4 are the elements on larger scale showing the example at the time of carrying out flat processing of the tip curved section, and drawing 5 (a) and (b) shows the X-X line and Y-Y line sectional view in drawing 2 thru/or drawing 4, respectively. Flat processing of the whole curved section L is carried out, a section presses the metal core wire 1 0.1 mm in diameter in one way like drawing 5 (b) from the state of drawing 5 (a) by a perfect circle, and a section makes drawing 2 0.01-0.27 mm (desirably 0.08 mm)-thick flat shape. Drawing 3 carries out flat processing of the center section of the curved section L like the above. Drawing 4 carries out flat processing of the tip part of the curved section L like the above. Thus, the pliability and

the processability of a guide wire tip part improve by performing flat processing.
[0026]
As mentioned above, the rigidity (pliability) of a tip curved section of it being possible also by the heat treatment temperature at the time of tip shape attachment is already publicly known, when core wire metal other than control of the diameter of a guide wire tip part is a nickel titanium system alloy. That is, setting out and rigidity of the target angle alpha become possible easily by performing temperature at the time of guide wire tip shape attachment predetermined time at 400 to 550 degrees. If shape attachment of the tip curved section is carried out on condition of the above-mentioned, in the case of a nickel titanium system alloy, a superelastic function will be altogether given irrespective of a work hardened type, a wire drawing type, a cooling wire drawing type, etc., and, as for the portion, rigidity will tend to become large relatively.
[0027]
Therefore, since the core wire diameter of a tip part is [tip shape attachment] difficult for a thin wire of 0.1 mm or less and R of a curved section with a small wire of 4 mm or less, shape attachment by the above-mentioned heat treatment is preferred. Therefore, the performance of the tip part of various beak type guide wires will be determined by the shape (the diameter of a tip part, taper processing, flat processing) of the metal core wire of a guide wire tip part, and the combination of a heat treatment condition.
[0028]
Desirable metal is a nickel titanium system alloy which has the character excellent in the introduction nature which cannot start residual strain easily. It is easy to carry out tip shape attachment or the RISHIE ping of the nickel titanium system alloy more preferably, And the work hardened type which cannot cause permanent deformation easily (JP,H6-83726,B), It is metal (JP,2000-140124,A) etc. which mechanical straightening is performed to linear shape, without heat-treating after a wire drawing type (JP,H5-508559,A) or cooling wire drawing, and do not show a martensitic transformation to stress induction.
[0029]
It is easy to carry out tip shape attachment or the RISHIE ping among these especially of the desirable thing, And it is a nickel titanium system alloy which it is hard to cause permanent deformation, and mechanical straightening is performed to linear shape, without heat-treating further after the cooling wire drawing excellent in pushing nature, torque convectivity, and reinsertion nature, and does not show a martensitic transformation to stress induction.
[0030]
Drawing 6 is a side view showing the shape of the guide wire called the conventional J type wire, and the angle alpha defined by this invention is almost parallel with the 0**5 times 5, i.e., a wire ground line, and the direction extension wire 6 of a tip. When J type wire was compared with the wire of this invention and it pushed in into the silicone tube of 3 mm in inside diameter a blood vessel model, the wire of this invention had smooth insertion, and there was little dispersion, and it was 1/10 or less [of the maximum pressing force of J type wire]. The guide wire from which pullout resistance is also obtained by this invention was about 1/4 as compared with J type wire. From the above model experiment, it is easy to push in the guide wire obtained by this invention to the purpose affected part, without damaging a blood vessel as compared with J type wire, and it is shown that after a therapy is safely recoverable.
[0031]
Drawing 7 is a side view showing the guide wire called the conventional angle-type wire, and the

angle alpha (angle which the ground line 7 and the direction extension wire 8 of a tip make) defined by this invention is the shape of 120 degrees or more. Introduction is difficult, when an angle-type wire is stuffed into the blood vessel model which branched right-angled by the silicone tube, and it is easy to move in a branching blood vessel part in a zigzag direction and introduces a wire from brachial ones or radial one especially. Since the guide wire obtained by this invention on the other hand controlled the above-mentioned meandering, the wire of this invention became clear [having the desirable performance].

[0032]

The pushing nature of a wire and J type wire obtained by this invention using further 4 French's guiding catheter, The same tendency as a place to have investigated pullout resistance was shown, and it became clear that the medical-application guide wire by which tip shape attachment was carried out at the angle defined by this invention is excellent in operativity.

[0033]

Although a nickel titanium system alloy, a copper system alloy, an aluminum system alloy, or stainless steel is used as metal of the core wire of a guide wire, in order to adapt oneself to blood vessel shape and to push in a guide wire, without doing damage to a blood vessel into branching / meandering blood vessel, pliability and shape stability are required. In recent years, a catheter comes to be pushed in a peripheral vessel and the demand is increasing increasingly. Although the stainless steel wire had mainly been conventionally used as a guide wire core material, there was a problem that remained causing and transforming permanent deformation when the inside of the winding blood vessel was passed, stopped pushing in a peripheral vessel, and reinsertion was not made, either.

[0034]

As a material which covers the metal of a core wire, from the necessity of giving a lubricative function further with the ease of covering. Flexible Polymer Division, such as a polymer alloy which uses these Polymer Division, such as polyurethane, a polyamide elastomer, a polyester elastomer, a polyolefin system elastomer, or a fluorine system, as the main ingredients, is used. Polymer Division covering material is flexible to such an extent that it does not become the hindrance of a curve of core material metal, such as resin, and the outside surface is the smooth surface which does not have unevenness substantially. In Polymer Division covering material, it is also possible to mix impalpable powder, such as tungsten, bismuth, and barium, as an X ray imaging substance.

[0035]

In order for the surface of Polymer Division which covers the metal of a core wire to decrease frictional resistance with a catheter internal surface or a blood vessel and to make good slidability reveal, coating is performed with hydrophilic giant molecules. As hydrophilic giant molecules, a hydroxyl group, an amide group, an amino group, a carboxylic acid group, a carboxylate group, a sulfonic acid group, a sulfonate group, and the thing that reaches or has hydrophilic radicals, such as a pyrrolidone group, are preferred. Specifically, vinyl ether - a maleic anhydride copolymer and vinyl ether - a maleic anhydride copolymer salt, polyether, polyacrylate, or a polyvinyl pyrrolidone is used.

[Work example 1]

[0036]

The nickel titanium system alloy (0.5 mm in diameter) of 0.89 mm of direct systems by which clothing was carried out with urethane of the medical grade which mechanical straightening is performed to linear shape and does not show a stress relaxation martensitic transformation to the

metal of a core wire, The guide wire which carried out the lubricous-ized coat by polo vinyl pyrrolidone is used, First, about 7 mm of tip parts were bent so that the angle of this direction extension wire of a tip and a wire ground line might turn into 90 degrees, and the guide wire was created by performing shape attachment so that the angle of the tip shape of drawing 1 carried out by this invention along with a circle 1.5 mm in radius may turn into 45 degrees further. As for 6.3 mm and length L of the curved section, length C of 7.2 mm and a tip straight part set width R of the curved section to 4.1 mm. The diameter which contains urethane clothing by a tip part set the diameter of the alloyed wire of 0.8 mm and a core wire to 0.1 mm. As a result of measuring pushing length and resistance when the obtained guide wire was pushed in at the rate of 500 mm/min in the silicone tube with a diameter of 3 mm which is a blood vessel model 3 times, the load at the time of pushing is constant at an average of 0.02 N, and it has checked following the inside of a tube smoothly. It was able to push in by 0.02N, and as a result of measuring resistance when drawing out a guide wire from a tube, from the time, the difference of the maximum and a minimum-drag value pushed in the average resistance at the time of drawing, and it was smaller than the time and was able to collect guide wires from the inside of a tube smoothly.

[Comparative example 1]

[0037]

The guide wire was created by performing shape attachment by the same method as working example 1 so that the angle of the tip shape of drawing 1 carried out by this invention along with a circle 1.5 mm in radius may turn into 0**5 times. As for 5.3 mm and length L of the curved section, length C of 8.8 mm and a tip straight part set width R of the curved section to 4.1 mm. The diameter which contains urethane clothing by a tip part set the diameter of the alloyed wire of 0.8 mm and a core wire to 0.1 mm. When it pushed in by the same method as working example 5 and the resistance at the time was measured, the average resistance of 0.1N-0.3N, and a drawing character suited the high tendency by 0.1N as compared with the thing of this invention.

[Work example 2]

[0038]

The nickel titanium system alloy (0.5 mm in diameter) of 0.89 mm of direct systems by which clothing was carried out with urethane of the medical grade which mechanical straightening is performed to linear shape and does not show a stress relaxation martensitic transformation to the metal of a core wire, The guide wire which carried out the lubricous-ized coat by polo vinyl pyrrolidone is used, First, about 9 mm of tip parts were bent so that the angle of this direction extension wire of a tip and a wire ground line might turn into 90 degrees, and the guide wire was created by performing shape attachment so that the angle of the tip shape of drawing 1 carried out by this invention along with a circle 2.0 mm in radius may turn into 45 degrees further. As for 6.9 mm and length L of the curved section, length C of 9.1 mm and a tip straight part set width R of the curved section to 3.7 mm. The diameter which contains urethane clothing by a tip part set the diameter of the alloyed wire of 0.8 mm and a core wire to 0.1 mm. As a result of measuring pushing length and resistance when the obtained guide wire was pushed in at the rate of 500 mm/min in the silicone tube with a diameter of 3 mm which is a blood vessel model 3 times, the load at the time of pushing is constant at an average of 0.035 N, and it has checked following the inside of a tube smoothly. It was able to push in by 0.033N, and as a result of measuring resistance when drawing out a guide wire from a tube, from the time, the difference of the maximum and a minimum-drag value pushed in the average resistance at the time of

drawing, and it was smaller than the time and was able to collect guide wires from the inside of a tube smoothly.

[Work example 3]

[0040]

The nickel titanium system alloy (0.5 mm in diameter) of 0.89 mm of direct systems by which clothing was carried out with urethane of the medical grade which mechanical straightening is performed to linear shape and does not show a stress relaxation martensitic transformation to the metal of a core wire, The guide wire which carried out the lubricous-ized coat by polo vinyl pyrrolidone is used, First, about 9.4 mm of tip parts were bent so that the angle of this direction extension wire of a tip and a wire ground line might turn into 90 degrees, and the guide wire was created by performing shape attachment so that the angle of the tip shape of drawing 1 carried out by this invention along with a circle 2.0 mm in radius may turn into 60 degrees further. As for 8.0 mm and length L of the curved section, length C of 9.3 mm and a tip straight part set width R of the curved section to 4.6 mm. The diameter which contains urethane clothing by a tip part set the diameter of the alloyed wire of 0.8 mm and a core wire to 0.1 mm. As a result of measuring pushing length and resistance when the obtained guide wire was pushed in at the rate of 500 mm/min in the silicone tube with a diameter of 3 mm which is a blood vessel model 3 times, the load at the time of pushing is constant at an average of 0.030 N, and it has checked following the inside of a tube smoothly. It was able to push in by 0.029N, and as a result of measuring resistance when drawing out a guide wire from a tube, from the time, the difference of the maximum and a minimum-drag value pushed in the average resistance at the time of drawing, and it was smaller than the time and was able to collect guide wires from the inside of a tube smoothly.

[Comparative example 2]

[0039]

The guide wire was created by performing shape attachment by the same method as working example 6 so that the angle of the tip shape of drawing 1 carried out by this invention along with a circle 2.0 mm in radius may turn into 0**5 times. As for 6.6 mm and length L of the curved section, length C of 9.8 mm and a tip straight part set width R of the curved section to 3.7 mm. The diameter which contains urethane clothing by a tip part set the diameter of the alloyed wire of 0.8 mm and a core wire to 0.1 mm. When it pushed in by the same method as working example 6 and the resistance at the time was measured, the average resistance of 0.16N-0.48N, and a drawing character suited the high tendency by 0.15N as compared with the thing of this invention.

[Work example 4]

[0041]

As a result of transposing a silicone tube to four French's catheter and measuring pushing resistance 3 times using the guide wire obtained from the same this invention as working example 1, the average load at the time of pushing was 0.06N. As a result of measuring resistance when drawing out from a catheter 3 times, the average resistance at the time of drawing was 0.08N, and its variation was also small.

[Comparative example 3]

[0042]

As a result of transposing a silicone tube to four French's catheter and measuring pushing resistance 3 times using the same J type guide wire as the comparative example 1, the average load at the time of pushing is 0.12N, It was in the large tendency as compared with the wire

obtained by this invention of working example 4, and variation was also a large result. It became clear that the average resistance at the time of drawing was also in a large tendency by 0.14N as compared with the wire obtained by this invention of working example 4.
[Work example 5]
[0043]
It was not introduced into a tee when the guide wire which created the branching model vessel of T character-like coronary arteries by a silicone tube 3 mm in diameter, and was obtained by this invention of working example 1 was pushed in.
[Comparative example 4]
[0044]
When the conventional guide wire which carried out shape attachment of the degree of point angle defined by this invention at 135 degrees was pushed in into a silicone tube by the same method as working example 5, the probability incorrect-introduced into 60 angles defined by this invention in a tip at a tee as compared with the guide wire which carried out shape attachment was large.
[Work example 6]
[0045]
The guide wire which carried out shape attachment of the tip at 70 angles defined by this invention was able to be introduced without using an inserter for a sheath or a catheter.
[Comparative example 5]
[0046]
The guide wire which carried out shape attachment of the tip at J type was very difficult to introduce into a sheath or a catheter, when not using an inserter.
[Possibility of industrial use]
[0047]
It is usable in the guide wire of this invention as the object for imaging or the guide wires for introducers, such as a brain and an abdomen besides coronary arteries.
[Brief Description of the Drawings]
[0048]
[Drawing 1]It is a side view showing the shape of one example of the guide wire obtained by this invention.
[Drawing 2]It is the elements on larger scale showing the example at the time of carrying out flat processing of the tip curved section.
[Drawing 3]It is a figure similarly [example of another].
[Drawing 4]It is a figure similarly [example of another].
[Drawing 5](a) and (b) are drawing 2 thru/or a X-X line in drawing 3, and a Y-Y line sectional view, respectively.
[Drawing 6]It is a side view showing the shape of the conventional J type wire.
[Drawing 7]It is a side view showing the shape of the conventional angle-type guide wire.
[Description of Notations]
[0049]
1 Guide wire
2, 5, and 7 Ground line
3, 6, and 8 Direction extension wire
4 Wire top end
A Curvilinear starting point

B Uppermost tip part
R Curved section width

CLAIMS

[Claim(s)]

[Claim 1]

It is a medical-application guide wire which has the tip part which consisted of a metal core wire by which surface coating was carried out by resin, and was bent in the shape of a smooth curve, An angle which direction extension wire of this tip part and a wire ground line make is 10 to 120 degrees, A medical-application guide wire by which the length of a curved section is used for beak type angiography or an introducer to which not less than 5-mm the width dimension of less than 10 mm and a curved section comes out less than 10 mm, and the length of not less than 3-mm less than 10 mm and a tip straight part is characterized by a certain thing.

[Claim 2]

A medical-application guide wire an angle which direction extension wire of this tip part and a wire ground line make was indicated to be to Claim 1 which is 20 to 90 degrees.

[Claim 3]

A medical-application guide wire an angle which direction extension wire of this tip part and a wire ground line make was indicated to be to Claim 1 which is 30 to 80 degrees, or 2.

[Claim 4]

A medical-application guide wire an angle which direction extension wire of this tip part and a wire ground line make was indicated to be to Claim 1 which is 40 to 70 degrees, or 2.

[Claim 5]

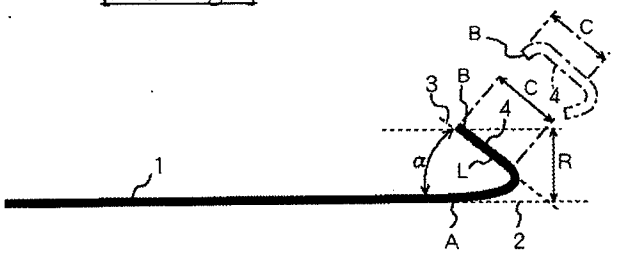
It is a medical-application guide wire which has the tip part which consisted of a metal core wire by which surface coating was carried out by resin, and was bent in the shape of a smooth curve, A medical-application guide wire used for beak type angiography according to claim 1, 2, 3, or 4 or an introducer whose diameter of a guide wire containing a resin layer is 0.46-1.02 mm.

[Claim 6]

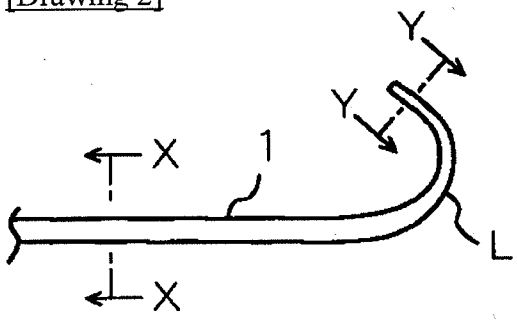
A medical-application guide wire the above-mentioned metal core wire was indicated to be to Claims 1, 2, 3 and 4 which are nickel-Ti system alloys, or 5.

DRAWINGS

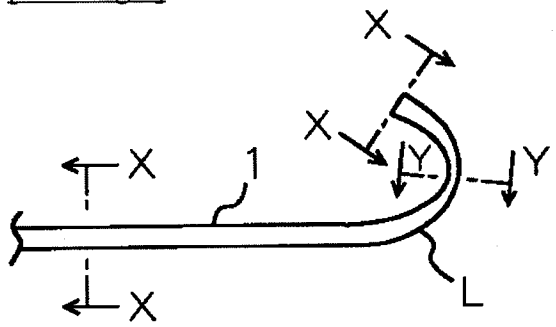
[Drawing 1]



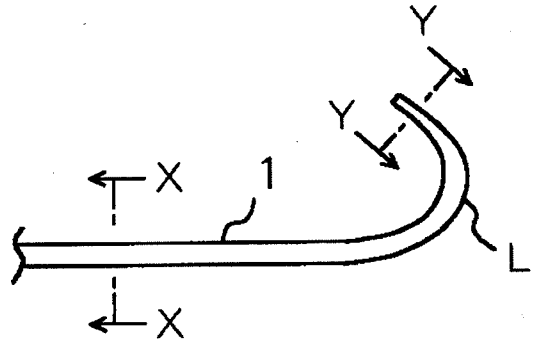
[Drawing 2]



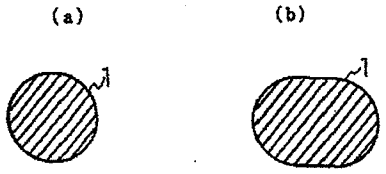
[Drawing 3]



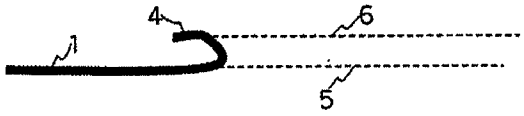
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Drawing 7]